City of Boulder
Open Space and Mountain Parks

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West Trail Study Area Plan
Inventory Report

Executive Summary and Key Findings

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OVERALL PURPOSE OF THE WEST TRAIL STUDY AREA (TSA) PLAN

The overall purpose of the West TSA Plan is to provide the management direction and describe the strategic actions that will protect natural and cultural resources, improve the visitor experience, and provide a physically and environmentally sustainable trail system in the West TSA.

The West TSA Plan will articulate the community's long-term vision, define desired future conditions, and identify on-the-ground management actions directed at achieving and maintaining desired conditions. The West TSA Plan will guide both day-to-day and long-term management decisions.

INTRODUCTION

The Inventory Report represents a compilation and analysis of information about existing conditions for the natural, cultural, and recreational resources in the West Trail Study Area. The information is based on field work, research studies, surveys, resource inventories, and on-the-ground knowledge of the area by OSMP staff and the public. The goal of the Inventory Report is to help inform West TSA decisions about how to balance providing a quality visitor experience and sustainable access and protecting the area's natural and cultural resources.

The West TSA Inventory Report is comprised of the executive summary / key findings (this report) and three separate reports dealing with natural, cultural, and recreational resources. While the reports vary to some extent based on the different resources, a common inventory approach was used.

Description of the West Trail Study Area

Setting. The West TSA forms the spectacular mountain backdrop to the City of Boulder. It contains highly diverse forested and grassland ecosystems at the juncture of the Rocky Mountains and the Great Plains. It is one of the most biologically diverse areas in Open Space and Mountain Parks (OSMP) and the Colorado Front Range. The West TSA mountain backdrop and transitional area to the plains is a globally unique and highly valued natural resource heritage. It also contains many cultural resources which tell stories of Boulder's past.

This dramatic rise of the mountains from the vast flat of the Great Plains not only sets the biological stage for high biodiversity and beauty, it also offers a wide range of exciting recreational opportunities. The West TSA contains many high-use visitor areas, receives almost half of the visitation to OSMP, and is a regional destination for recreation. In addition, the West TSA shares boundaries with numerous city and county neighborhoods whose residents access and recreate on the nearby OSMP lands. With so many people enjoying the beauty of this area, the juxtaposition of high resource values and high visitor use creates many challenges to sustaining the health of ecosystems and providing high-quality visitor opportunities that are compatible with resource conservation.

Location and Acreage. The West Trail Study Area includes Open Space and Mountain Parks lands west of Broadway and SH 93 from Linden Avenue to Eldorado Springs Drive. See West TSA Basemap. The large size of the West TSA requires an area-wide planning approach to address habitat protection and connections at a landscape level and address trails and trail connections in a larger geographic context. The West TSA includes approximately 11,250 acres, with 10,700 acres owned and managed by OSMP and 550 acres of federal lands where OSMP is cooperatively assisting in the management of natural resources and visitor use (approximately 100 acres of National Institute for Standards and Technology property and 450 acres of National Center for Atmospheric Research property).

The Visitor Master Plan management area designations are shown on the West TSA Basemap (see descriptions on page 10). The management areas include Passive Recreation Areas (1,500 acres), Natural Areas (5,240 acres), and Habitat Conservation Area (3,960 acres).

The West TSA Basemap identifies OSMP conservation easements (CEs). These CE lands are owned by other parties, but OSMP has conservation easement agreements on them which preclude most or all new development and require protection of the conservation values on the property. The privately-owned CE lands do not allow public access and their management is outside the scope of the West TSA Plan and therefore not included in the West TSA planning area.

Appendix B summarizes legal agreements and past planning affecting West TSA recreational access.

Natural Ecosystems. Many of the ecosystems in the West TSA are generally healthy and functioning naturally. The West TSA contains a wide array of rare, sensitive, and unique plant species and communities and wildlife species, some of which are highly sensitive to human presence and visitor use. In the ever increasing urbanization of the Front Range, the West TSA provides extremely valuable habitat and refuge to sensitive species. Some of these natural assets are or will be threatened by high and increasing visitor use and increasing dispersal of the use. A major focus of the West TSA Plan will be to maintain or increase the level of natural resource protection and restoration, in order to maintain the balance between resource protection and recreation.

Cultural and Geological Resources. The West TSA contains a wide range of important paleontological, archaeological, historic, and geologic resources. There are cultural features and sites important to indigenous people, sites and structures indicative of European settlement and mining, and trails and structures constructed by the Civilian Conservation Corps (CCC) still used by visitors. The well-known West TSA geological formations, such as the Flatirons and Red Rocks, showcase Boulder's geological history and contribute to the beauty of the mountain backdrop. Some of these cultural and geological resources require a higher level of protection, in order to enable long term stewardship of the resource.

Recreational Resources. Recreational opportunities abound in the West TSA, and many consider it a world-class recreational destination. The West TSA offers a wide range of recreational opportunities—from hiking, contemplation, and nature study to rock climbing, horseback riding, and dog walking. Most visitors to OSMP (and likely to the West TSA) report a high quality of experience, and a large number of visitors greatly enjoy the natural setting for passive recreation. However, increasing levels of visitor use over time have degraded the visitor experience with loss of remoteness and increased visitor conflict. Another major focus for the West TSA Plan will be to maintain or improve the quality of visitor experience.

Trail System. The West TSA contains an extensive designated trail system (78 miles), in places densely packed together, with many mountain backdrop trails developed in the early 20th century. A majority of these older designated trails were not located or built to be physically and environmentally sustainable. Many were built in canyon riparian areas, which are some of the most ecologically sensitive lands in the West TSA. A large number of user-created undesignated trails (58 miles) also exist that may not be physically or environmentally sustainable. Some undesignated trails provide access to destinations not served by designated trails, while others result in multiple trails to the same destination. Another major focus for the West TSA Plan will be on making the existing trail system more sustainable and on reducing the extensive network of undesignated trails to reduce resource impacts. A large number of proposed West TSA trail and trailhead improvements (trail reconstructions, refurbishments, and reroutes; trailhead / trail access improvements; priority new trail connections; and critical road crossings) are identified in the Visitor Master Plan. These improvements are intended to improve trail sustainability and the visitor experience.

Visitor Master Plan Management Area Designations in the West Trail Study Area

West TSA Plan recommendations will include management objectives and strategies for providing resource protection and visitor opportunities. Management Area designations, adopted as part of the Visitor Master Plan (VMP), will provide the context for decision making.

All OSMP lands are categorized under one of four management area designations in the VM P. Three of these management area designations exist in the West TSA: Passive Recreation Area, Natural Area, and Habitat Conservation Area (HCA). The VMP identifies goals and specific management strategies to be applied to the different areas, which are based on different land characteristics (e.g., physical and ecological qualities, existing and anticipated visitor use patterns, existing and potential visitor infrastructure, among others).

The primary goal of each management area is to plan for and facilitate visitor use in areas that can best accommodate the use, which includes providing a high-quality visitor experience and ensuring compatibility of visitor use with natural, cultural, and agricultural resources. The Management Area Designations provide a framework to decide what level of resource protection, visitor access and activities, and trail and facility development are most suitable in a given area.

On one end of the spectrum, the emphasis in Passive Recreation Areas is on providing a high-quality visitor experience in areas that are closer to where people live and work and accommodating a higher level of visitor use, while protecting the natural and cultural resources. At the other end of the spectrum, in Habitat Conservation Areas the emphasis is on protecting and restoring the high habitat values in the more pristine, less human-modified areas within OSMP, while providing a high quality visitor experience in more remote areas. Natural Areas are in the middle of the spectrum, where the emphasis is on protecting the natural and cultural resources and accommodating low to moderate levels of visitor use.

The following is an abbreviated list of characteristics and goals of the three management areas in the West TSA. The complete description of the management areas can be found in the VMP (pp. 47-55).

Passive Recreation Areas (PRA)

- Generally in close proximity to city or county development and may include patches of high quality habitat.
- Offer destinations for a wide range of different passive recreational activities.
- Accommodate high levels of visitor use with appropriate management, trails and trailheads and services.
- Provide a high level of public access to destinations and connections through designated trails (also have a relatively high density of trails).
- Discourage travel on undesignated trails.

Natural Areas (NA)

- Relatively high resource and recreation values.
- Varying levels of visitor use, types of activities, and availability of facilities.
- Provide opportunities for passive recreational and educational activities that require topographic relief or a natural setting (e.g., hang/paragliding, climbing/bouldering).
- Interspersed recreational and natural values require that management determine the appropriate mix of open space purposes and manage multiple uses accordingly.
- Eliminate undesignated trails when they are redundant or damaging to resources.

Habitat Conservation Areas (HCA)

- Tend to be located in remote areas and represent the largest blocks of an ecosystem type with few, if any, trails or roads.
- Naturally functioning ecosystems, high potential for restoration of natural ecosystems.
- Low level of visitor use and low level of developed facilities.
- Provide public access and passive recreational opportunities that foster appreciation and understanding of ecological systems and have minimal impacts on native plant communities and wildlife habitats or other resources.
- Eliminate all undesignated trails, unless they are made part of the designated trails system or provide specialized access to appropriate low-use destinations.

West TSA Planning Process and Next Steps beyond the Inventory

There are four phases of the West TSA planning process:

Phase 1: Inventory of Existing Conditions

Phase 1 is conducted primarily by OSMP staff (with input from the public and the Open Space Board of Trustees). Phase 1 is focused on providing the essential information base and management direction for the rest of the planning process.

Key Questions:

- What resources should the plan focus on? What are existing conditions for those natural, cultural, and recreational resources?
- What are key issues and interests that the community feels should be considered in the plan?

Planning Steps:

- Identify targets, attributes, and indicators (TAIs) for natural, cultural, and recreational resources *(see definitions below)*, which organize the inventory of existing conditions.
- Characterize existing resource conditions using the TAIs.
- Review information and direction from adopted plans and identify what Open Space and Mountain Parks (OSMP) and the Open Space Board of Trustees consider essential requirements (sideboards) to be built into the West TSA Plan.
- Assess the existing situation, which involves identifying key issues and interests articulated by a number of community members.

Completion of this phase involves Open Space Board of Trustees and public review and then revision of three reports:

- West TSA Inventory of Existing Conditions Report (this report)
- West TSA Sideboards and Desirables Report
- West TSA Situation Assessment Report

What are Targets, Attributes, and Indicators?

- **Targets** broadly define what we are planning for—those natural, cultural, and recreational resources that we are trying to protect, provide, and manage.
- **Attributes** define essential qualities or components of targets that, when present, result in long term sustainability of the target. When these attributes are absent or are severely compromised, the target is no longer sustainable without significant management effort and could be lost completely.
- **Indicators** are quantitative and qualitative measures of the attributes; they are what we measure to track conditions of the attributes. One or more indicators are selected for each attribute. Indicators help us characterize existing and desired future conditions for the attributes and inform us of their status or health. Thresholds can be selected for indicators to help identify at what point conditions are acceptable or within the range of desired conditions.

Examples:

Target	Attribute	Indicator
Mixed Conifer Forest	Wildlife and Habitat Effectiveness	% of Highly Suitable Goshawk Habitat in the Target
Historic Buildings and Structures (BSOs)	Integrity of Historic Buildings and Structures	% in Excellent to Good Condition
Visitor Experience	Access to Destinations	Proportion of Key Destinations Served by a Designated Trail in Each of the VMP Management Area

The West TSA Plan will include recommended actions to maintain existing acceptable (or good) conditions and bring unacceptable (fair or poor) conditions up to acceptable for many of the West TSA natural, cultural, and recreational attributes and indicators. OSMP is using the Conservation Action Planning (CAP) framework for setting measurable standards for what is considered "acceptable" and directing proposed management strategies and actions to maintain or achieve acceptable conditions. Standards or thresholds of acceptability may be developed by the Community Collaborative Group for selected indicators. In some cases the indicator data is collected system-wide only (such as responses from the visitor survey); in other cases the data is location specific (such as condition of particular trail segments). The indicators are system-wide or TSA-wide measures of success for evaluating overall cumulative progress. In other words, what is the overall effect of the package of individual on-the-ground management actions in moving toward acceptable conditions at the system-wide or TSA-wide level? The indicators also allow individual management actions to be evaluated on the extent that they discretely contribute to acceptable conditions. In other words, what is the effect of individual management actions in moving toward acceptable conditions of the targets and attributes?

A detailed description of the West TSA TAIs can be found in the West TSA Targets, Attributes, and Indicators Report (March 2009). Appendix A includes a summary table identifying the West TSA TAIs.

Phase 2: Definition of Desired Conditions

Phase 2 is conducted by a Community Collaborative Group (CCG) with the involvement of OSMP staff. This group will be composed of a representative cross-section of diverse community interests that have a stake in the West TSA. Phase 2 involves defining a broad-brush vision for the West TSA, prioritizing issues and opportunities to focus on, and defining desired future conditions with enough specificity to drive the rest of the planning process.

Key Question:

- What are the desired future conditions for natural, cultural, and recreational resources that the plan focuses on?
- How do existing conditions and desired future conditions compare?

Planning Steps:

- Define desired future conditions for the natural, cultural, and recreational resources using the selected targets, attributes, and indicators.
- Set management objectives and thresholds of acceptability for the attributes and indicators.
- Assess what resources meet or exceed desired conditions and what resources fall short of desired conditions.
- Identify the range of possible strategies that could be used to maintain desired conditions and bring existing conditions up to desired conditions.

Phase 3: Development of Plan Implementation Strategies

Phase 3 is conducted by the CCG with the involvement of OSMP staff. A consensus-based plan is produced by the CCG. The focus is on finding creative solutions to planning problems and opportunities. The CCG will grapple with the tradeoffs involved in meeting competing needs and desires, and attempt to strike the right balance between resource protection and visitor use. The aim of the plan is to provide a package of on-the-ground changes that will provide overall improvement in conditions for natural, cultural, and recreational resources.

Key Question:

- What is the most beneficial and feasible package of plan proposals to maintain or achieve desired conditions?

Planning Steps:

- Develop and evaluate plan alternatives and scenarios that involve on-the-ground management strategies and actions to maintain desired conditions and bring existing conditions up to desired conditions.
- Select preferred plan alternatives.
- Develop a cohesive plan and implementation program (including monitoring) for the West TSA.

Once the plan is adopted, management actions are implemented, success is monitored and management strategies and actions are adjusted to improve their effectiveness. The plan implementation horizon for the West TSA Plan is ten years.

A major goal for the West TSA Plan is to make the existing trail system more physically and ecologically sustainable. Much of the West TSA trail system was developed without consideration of minimizing impacts on natural resources. If new trails are planned in the West TSA, they will have to minimize impacts on natural resources.

Ensuring the long-term sustainability of ecosystems is an underlying goal for all OSMP plans. For TSA plans, maintaining or improving natural resource conditions frames decisions on the best way to enhance and manage recreational access and opportunities. Natural, cultural, and recreational resource information in the West TSA Inventory Report, along with subsequent work to assess the current health or status of these resources, will help us decide the best way to provide natural resource protection in the context of high visitation and the desires for enhanced recreational opportunities.

The West TSA Inventory Report provides information and analysis to identify the most ecologically valuable and sensitive habitat areas and map these identified areas with an overlay of designated and undesignated trails and access points, and cultural resources. Knowing where the most valuable habitat areas and culturally significant sites are will help guide decisions on where existing trails should be rerouted to avoid or minimize impacts and where undesignated trails should be designated / improved or closed and restored. Knowing where these habitats areas and culturally significant sites are will also guide decisions on where to locate new trails to minimize impacts. "Best opportunity areas" will be identified—places where compatibility between resource protection and recreational access has the best potential.

SUMMARY OF KEY FINDINGS

Natural Resources

The West Trail Study Area is a complex and diverse mosaic of ecosystems and habitats, which supports a rich diversity of plant and animal species and ecological communities. Large contiguous blocks of ponderosa pine woodlands and mixed-conifer forests support forest interior species and allow wide-ranging species to move across the landscape. Riparian areas and cliffs provide unique habitat types for some of the rarest species on the OSMP system. Forest / grassland edges and forest meadows provide habitat for species adapted to both forest and grassland ecosystems and are some of the most productive and diverse zones on the landscape. Grassland habitat support diverse plant and animal communities, including several rare or imperiled species.

Rare Plant Species and Communities

Rare plant species and communities are widely distributed in the West TSA. The highest number of occurrences is located in riparian areas and the largest acreage in the xeric tallgrass prairie. Rock cracks and crevices harbor many rare plant species and communities.

Non-Native Weed Prevalence

The targets with the most complete non-native weed mapping are Foothills and Montane Riparian, Ponderosa Pine Woodlands and Savannahs, and Foothills and Montane Forest Openings.

Weed prevalence is an indicator of vegetation composition for several natural resource targets. Weed prevalence varies widely among the targets in the West TSA , with very low prevalence in the Mixed Conifer Forest and Woodlands Target (0.4% of the target has ≥6% weed canopy cover) and the Cliffs and Talus Target (1.4% of the target has ≥6% weed canopy cover). For the other targets (Ponderosa Pine, Riparian, and Forest Openings), it ranges from 6.2 to 12.6 %.

Of the areas that have been mapped to date, the highest weed concentrations occur in the Sanitas, Anemone Hill, and Chautauqua areas, and the grassland area south of NCAR and Shanahan Ridge. Trails in the higher elevation foothills generally have lower weed prevalence, while lower elevation trails have higher weed prevalence.

Potential Highly Suitable Wildlife Habitat and Trail Effects

All areas within the West TSA provide habitat for plant and animal species. These lands provide habitat for both common and rare species. Known information about existing wildlife populations and their occupied habitat was compiled for the West TSA Plan. This on-the-ground wildlife and habitat information will be considered when areas are identified and evaluated for possible changes to the existing trail system and visitor activities (new focused field work will also be completed for this evaluation).

Because it is not feasible to survey and inventory all species and habitats on the ground, potential wildlife habitat in the West TSA has been identified and evaluated for selected wildlife indicator species using habitat suitability (HS) models. These wildlife indicator species are characteristic of the ecosystem type where they occur, and they play the role of "umbrella" species, i.e., they represent the habitat needs of many other species with similar needs. The well-supported assumption is that maintaining or restoring good habitat for the wildlife indicator species directly benefits many other species with similar habitat needs.

Habitat suitability models are commonly used to identify areas that have the characteristics to be highly suitable for the indicator species. Key environmental and biological characteristics and habitat requirements of the wildlife indicator species were identified from the scientific literature and other habitat suitability models. The HS models identified wildlife habitat suitable for each of the indicator species. Then "the best of the best" of the suitable habitat was identified as highly suitable habitat.

"Percent of Target with Highly Suitable Habitat" was calculated for each of the wildlife indicator species. The modeling results for the West TSA wildlife indicator species showed that the percent of highly suitable wildlife habitat compared to total suitable habitat varies widely. The results, from high to low were:

Wild Turkey Habitat—74% (703 out of 956 acres)
(Indicator for Foothills and Montane Forest Openings)

Abert's Squirrel Habitat—41% (1221 out of 2964 acres)
(Indicator for Ponderosa Pine Woodlands & Savannahs)

Northern Goshawk Habitat—29 % (1128 out of 3832 acres)
(Indicator for Mixed Conifer Forest)

Shrub-Nesting Bird Habitat—20% (47 out of 241 acres)
(Indicator for Foothills and Montane Riparian Areas)

For the highly suitable wildlife habitat, "trail effect" was analyzed using known information about the flushing or disturbance distance caused by human presence on roads or trails. Trails and roads were overlayed on the highly suitable habitat. The effect of trails and roads is to reduce the effectiveness of wildlife habitat, which potentially reduces the amount of highly suitable habitat. Taking trail effect into account, the modeling results show that the percent of highly suitable wildlife habitat is potentially reduced, as follows:

- **Wild Turkey Habitat.** Highly suitable habitat decreased from 703 acres (74%) to 25 acres (3%). due to trail effect. Trails and roads split all the turkey meadow breeding areas to patch sizes of 89 hectares or less. Turkey populations are present in the West TSA, with concentrations in Green Mountain West Ridge and Cathedral Park / Lost Gulch areas and along the South Mesa Trail.
- **Abert's Squirrel Habitat.** Highly suitable habitat decreased from 1221 acres (41%) to 349 acres (12%) due to trail effect.
- **Northern Goshawk Habitat.** Highly suitable habitat decreased from 1128 acres (29%) to 134 acres (3%) due to trail effect.
- **Shrub-Nesting Bird Habitat.** Highly suitable habitat decreased from 47 acres (20%) to 15 acres (6%) due to trail effect.

These decreases in highly suitable habitat for wildlife indicator species are due to the large number of trail miles and high concentration of trails in the West TSA (especially in areas at lower elevation and closer to the city).

Trails in Riparian Areas

The development of many of the trails in the West TSA follow historical settlement roads, mining roads, regional roads providing access to the western mountains, and user-created trails. As a consequence, almost all the east-west canyons (Sunshine Canyon, Boulder Creek, Gregory, Long, Lost Gulch, Greenman, Bear Creek, Shadow, and South Boulder Creek) have designated trails or roads in them, and all major drainages have trails immediately adjacent to or within the riparian vegetation for much of their lengths. Since riparian areas provide important habitat for many rare and sensitive plant communities and sensitive wildlife species, the presence of trails or roads decreases the effectiveness of wildlife habitat and wildlife movement corridors.

Approximately 28 % (22.5 miles) of the West TSA's 78 designated trail miles are in or near riparian areas. Approximately 19% (14.7 miles) of the West TSA's designated trail miles are in critical bear foraging habitat, and approximately 13% (7.3 miles) of the West TSA's 58 undesignated trails are in this habitat. In critical bear foraging habitat, dogs are allowed on 14 miles out of 15 designated trails. Designated trail density in critical bear foraging habitat is an average of 61 feet per acre; for undesignated trails it is an

average of 30 feet per acre. Additional mapping will allow comparison of this trail density among different creek canyons.

Mapping of the occupied range for the Federally-threatened Prebles's meadow jumping mouse shows that almost all the major drainages in the West TSA provide suitable Preble's habitat according to the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife.

Cliff-Nesting Bird Protection

The Boulder mountain backdrop has one of the highest densities of productive nests for cliff-nesting falcons and eagles in the entire Front Range. Not only does the mountain backdrop offer many steep rock walls and crags, but known active nests are protected by seasonal wildlife closures.

44% of highly suitable cliff-nesting raptor habitat falls within an existing seasonal wildlife closure.

Wildlife Population Monitoring

These are key points summarizing results from recent monitoring:

Forest Birds

- Forest birds have significantly higher numbers of individuals and species in thinned, open ponderosa pine forest stands as compared to un-thinned, dense areas.
- Forest stands that have been thinned provide habitat for a wider range of forest bird species.

Accipiter Surveys

- Surveys of accipiters (hawks that inhabit deeply wooded areas) were conducted in 2008 to locate potential breeding areas for forest raptors in the West TSA.
- Staff surveyed Gregory Canyon, Flagstaff, Panther Canyon, Lost Gulch, North Draw and Aspen Canyon during the 2008 field season.
- In Lost Gulch staff located two Cooper's Hawk nests where successful breeding had taken place.
- In Aspen Canyon, staff observed two Cooper's Hawk fledglings close to a nesting site.
- A juvenile Northern Goshawk responded to broadcasts at two stations in the Flagstaff study area but was not detected during subsequent surveys.

Forest Owl Surveys

- Staff surveyed four canyons, Gregory, Aspen, Shadow and Panther, for Flammulated Owls during the 2008 field season.
- Surveys in all four canyons produced responses from Flammulated Owls.
- A Long-eared Owl was also detected in Shadow Canyon.
- Fledging Long-eared Owls were located on Shanahan Ridge.

Cliff-nesting Raptor Monitoring

- During 2008, 49 volunteers logged 587 site visits for the cliff-nesting raptor monitoring program.
- In total, three Prairie Falcon pairs produced 15 fledglings, two golden eagle pairs fledged three young, and two Peregrine Falcon pairs fledged three young.
- Cliffs in the West TSA provide unique and exceptional habitat for cliff-nesting raptors.

Northern Leopard Frog Monitoring

- Northern leopard frog populations on OSMP property face threats that affect many other Western U.S. populations and have led to a precipitous decline in leopard frogs in the Western U.S. The most apparent threats are habitat degradation and loss, fungal infection, and predation from non-native species.
- In the West TSA, eight sites were surveyed for Northern Leopard Frogs from 2006-2008. Leopard frogs were observed at one of these sites in 2006 and two of these sites in 2007.

Bat Monitoring

- On average 20-40 volunteers spend 400 hours/year conducting auditory and visual counts of bats at water holes.
- Volunteers and staff monitor wildlife closures for 2 imperiled bat species, the Fringed Myotis (*Myotis thysanodes*) at Der Zerkle and the Townsend's Big Eared Bat (*Corynorhinus townsedii*) at Harmon and Mallory Caves.
- Seven watering holes and four roost sites are regularly sampled for bats within the West TSA boundary.

Tallgrass West Bird Monitoring

- Tallgrass West (the area of grassland habitat west of Hwy 93 between Shanahan Ridge to north and Eldorado Springs Drive to south) is an area of regional importance characterized by locally rare big bluestem communities that serve as home to many grassland nesting bird species of conservation concern.
- Over the four years of study completed to examine effects of grazing regime shifts, staff detected 51 species of birds at the Tallgrass West study sites. Of these, 49 were native and five are considered grassland specialists.

Cultural Resources

The West TSA is rich in cultural resources, ranging from fossilized remains of ancient sea life and dinosaurs, sites and artifacts used by Native Americans, and roads, mining sites and homesteads used by Euro-Americans. These and other cultural resources tell stories of past human activities, how people lived over the ages, and their effects on the land. For the West TSA, cultural resource management actions will be planned to preserve and in some cases interpret those cultural resources that are frequented by OSMP visitors or are near current or planned trails.

Some paleontological sites and features in the West TSA have been identified. Fossilized dinosaur footprints, worm trails, mollusks, stromatolites and trace fossils of ripples have been found in the West TSA. Current information will be supplemented by a comprehensive survey of these resources and their protection needs to be completed in fall 2009.

Several locations of aboriginal sites and artifacts are known. Aboriginal features in the West TSA are predominately scatters of flakes, rock shelters, or stone structures (e.g., hunting blinds, tipi rings). However, resource protection needs and agreements dictate that these locations not be shared with the public.

Euro-American sites, buildings, and structures reveal much about early settlement times. Physical remains and recorded historical accounts point to a wide variety of historic land use activities in the West TSA. The major activities included:

- Mining of gold and other minerals
- Homesteading, farming, ranching, and logging
- Early recreation (summer cabins)
- Entertainment, education, and recreation (Chautauqua National Historic District)
- Health care related to clean air and the outdoors (Sanitas)
- Depression-era economic recovery (numerous recreational shelters, roads, Sunrise Circle Amphitheater, Green Mountain Lodge built by the Civilian Conservation Corps/ CCC)
- Transportation (roads leading to mines and other settlements, bridges, rock walls, trails)
- Water transmission (ditches and pipelines)

Information on the current physical condition and historical integrity of many of the Euro-American sites, buildings, and structures will be updated with field work in 2009.

A large proportion of the Euro-American sites, buildings, and structures are in close proximity (100 feet) to roads, trails, trailheads, and other visitor use areas. This proximity provides opportunities for interpreting the resources to enhance visitor appreciation of them and also provides, in some cases, the need to secure these resources from the impacts of visitor use.

Recreational Resources

Visitation Patterns

- **Visitation Numbers.** The Visitation Study conducted in 2004-05 estimates that system-wide there were approximately 4.7 million person visits annually (compared to about 3 million visits in 1996), with 40-45% of the visits in the West TSA.
- **Visitor Activities.** The 2004-05 Visitor Survey showed that about half of the respondents hike or view scenery, a third walk their dog, and a quarter view wildlife or run. In identifying activities, respondents could select more than one activity.
- **Regional Destination for Recreation.** System-wide, 81% of the survey respondents were Boulder County residents (57% were city residents and 24% other cities plus unincorporated), 8% Denver metro residents, and 11% other residents. The percent of out-of-county visitors may be higher in the West TSA because the mountain parks are well-known nationally and even internationally as a destination.
- **High-Use Areas.** Of the 236 designated access points system-wide thought to have at least three or more visitors per day, 42% (100) of them are in the West TSA. The highest use areas in the West TSA were the Chautauqua, Sanitas / Centennial, and South Mesa areas.
- **Seasonality of Use.** Some sites see their biggest visitation in the summer followed by spring and fall. Other sites, such as the Chautauqua and Sanitas areas, see regular visitation year-round.

Visitor Experience

Recreational Opportunities

- **Types of Recreational Activities.** The West TSA offers a wide range of passive recreational activities from hiking, contemplation, and nature study to rock climbing, horseback riding, picnicking and social gatherings, and dog walking. Some activities are currently prohibited, most notably bicycling and paragliding / hang gliding.

- **Comparison to Other Agencies.** Compared to other similar front-range open space agencies, the OSMP system provides more off-leash dog walking opportunities and fewer mountain biking opportunities.
- **Dog Walking.** Dog walking in the West TSA is primarily off-leash under voice and sight control. Considering dog walking regulations on the West TSA trails, the current situation is: 70% are off-leash under voice-and-sight control (55 miles), 25% on-leash year-round or seasonally (25 miles), and 5% no dogs (4 miles).
- **Accessibility.** In the West TSA, there are 1.1 miles of trails accessible to people with disabilities. Seven trailheads are accessible.

Access to Destinations

- **Key Visitor Destinations.**
  - In the West TSA OSMP has identified has identified 152 key destinations (visitor facilities, natural features, popular gathering spots, and popular rock climbing and bouldering areas).
  - 102 (67%) of the key destinations are served by a designated trail, with the highest percent served in the Passive Recreation Areas (80%) where there is the highest density of trails.
- **Trail Mileage.** The West TSA has 78 miles of designated trails. These trails provide visitors access to a variety of destinations, provide connections within the trail system, and offer quality recreational experiences. Some of these trails may not be physically or environmentally sustainable.
- **Undesignated Trails.**
  - The West TSA has 58 miles of undesignated trails. Undesignated trails result from a variety of causes, including: users creating access to destinations or links between designated trails; users avoiding muddy areas which results in trail braiding; and neighbors accessing OSMP lands from a host of undesignated access points.
  - Often multiple undesignated trails go to the same destination.
  - Most undesignated trails have significant problems with physical sustainability or are located in sensitive habitat. 36% of the undesignated trails are in the very high to high impact (on natural resource) rating category, 58% are in the moderate impact rating category, 6% are in the mid-low-least impact rating category.
  - Most undesignated trails are in close proximity to designated trails and roads, with the highest undesignated trail densities found in Chautauqua Meadow, Flagstaff Mountain, and Settlers Park.
  - Some undesignated trails are caused by missing key trail connections.
- **Designated and Undesignated Access Points.**
  - Visitor access to the West TSA is widely dispersed along its boundaries.
  - There are 51 designated access points (including trailheads and other signed entry points) in the West TSA.
  - There are 136 undesignated access points (and undesignated trails leading from them) along the western edge of the city, primarily originating from neighborhoods.
  - The 51 designated access points provide convenient access to adjacent neighborhoods, with almost 80% of them located within ½ mile of another access point.
- **Wayfinding Signs.** Intended to guide visitor travel, wayfinding signs are provided at about 2/3 of the designated trail intersections. There are very few signs indicating to visitors that an undesignated trail is not a designated trail to discourage trail use.

Lack of Conflict

- **Visitor Conflict.**
  - Most OSMP visitors have an experience free of conflict or unpleasant circumstances.
  - The 2004-05 Visitor Survey reports that system-wide 96% of visitors did not experience conflict with other visitors on the day they completed the survey. Some visitors, however, experience visitor conflicts that occur when they encounter other visitors whose behaviors are annoying or unpleasant.
  - About 4% of visitors reported they had experienced conflict on the day they were surveyed. With 4.7 million annual person visits to OSMP, this percent could result in almost 200,000 yearly conflict incidents.
  - Visitors reported that 60% of the conflicts involved dogs and dog excrement, 17% involve management-related concerns, and 15% involve inconsiderate behavior.
- A different survey, the 2004-05 Citizen Survey, shows that bikes and dogs were the greatest source of conflicts (37% and 23% respectively).

Connection with the Land

- **Interpretive Hikes.** OSMP offers hundreds of natural and cultural history interpretive hikes every year, and participant feedback surveys show that a very high degree of satisfaction with them (average rating of 9.2 out of 10).
- **Educational Events.** In the 2004-05 Citizens Survey, 47% of the respondents said they had participated in an OSMP educational event, including guided hikes but also a wide range of other events (such as in-school programs, Farmer's Market, and educational and outreach information provided on-line and in the media).
- **Volunteer Opportunities.** A wide range of volunteer opportunities are offered (15 programs, resulting in 25,000 volunteer hours per year), and OSMP volunteers report they are very satisfied with their volunteer experience.

Safety

- **Perception of Safety.**
  - The 2004-05 Citizens Survey indicates that 95% of participants consider their OSMP visits safe, with 74% rating their visits as "very safe".
  - The most reported reasons in the 2004-05 Citizens Survey for not feeling safe were:
    - Presence of mountain lions / fear of being killed by a bear
    - Concerns about being alone / not knowing who else is visiting
    - Security gaps / not enough rangers / car break-ins
- **Law Enforcement Incidents.** Rangers respond to many different types of law enforcement incidents in the West TSA. In 2008 the most numerous incidents were dog related (268) and illegal camping (68).

Remoteness

- **Perception of Remoteness.** Visitors to the West TSA have numerous opportunities to experience the feeling of remoteness and escape from the built environment on designated trails and off-trail. There are several factors that create this feeling of remoteness in the Western Mountain Parks Habitat Conservation Area (HCA) and other areas in the West TSA, including the large physical size of the area, steep topography and forested landscape, significant time required to access more distant trails, and low visitation on many trails.
- **Undesignated Trails.** There are 3.5 miles of undesignated trails in the Western Mountain Parks HCA, which may detract from some visitors' perceptions of remoteness.
- **Trail Signs.** Sign structures along a trail can detract from a sense of remoteness. The HCA and Natural Areas in the West TSA have about 3 ½ sign structures per mile.

Visitor Infrastructure

- **Trail Conditions.**
  - OSMP manages 78 miles of designated trails in the West TSA over many different kinds of terrain.
  - Many of the West TSA mountain backdrop trails were built in the early 20th century and were not located or built to be physically and environmentally sustainable.
  - OSMP has established trail construction and maintenance guidelines and standards that are designed to match different classes of trails, which vary based on the allowed uses on the trail and the level of development. These standards set the benchmark to assess the condition of the trails over time and determine appropriate trail management actions.
  - Each trail is assigned a trail class and is rated against its appropriate standards, which are factored into its Trail Management Objective (TMO) Index. A determination can then be made on whether any given trail is in or out of compliance with its TMO Index.
  - A current inventory of the condition of trail segments in the West TSA reveals that 63% are in Very Good or Good condition (49 miles), and 29% are in Fair, Poor, or Very Poor condition (23 miles). The inventory has not yet been completed for 8% (6 miles).
  - Of the West TSA trail segments that do not comply with their TMOs, 81% of the trails are out of compliance due to grades being too steep, and 14% due to trails being too wide.
- **Trail Maintenance.**
  - Erosion is the primary maintenance problem, with the most eroded trails in the Kohler Mesa, mountain backdrop, Flagstaff Road, Red Rocks, and Mount Sanitas areas.
  - Several reasons are behind the fact that over 1/3rd of the West TSA Trails are not sustainable and are in fair or poor condition, including: unsustainable location or design, steep grades and erodible soil substrates, high levels of use, and long-term lack of regular maintenance.
- **Concentrated Use Area Conditions.** Examples of concentrated use areas include trailheads, access points, road crossings, overlooks, amphitheaters, picnic areas, and large group areas. There are 51 Concentrated Use Areas in the West TSA, fourteen are trailheads, 33 are access points, and four are recreational facilities. OSMP has established Classes and Standards for trailheads, access points and recreational facilities, which are used to evaluate the conditions, determine whether they are in or out of compliance, and identify necessary upgrades. None of the Trailheads in the West TSA are in compliance, around 67% (22 of 33) of the Access Points comply, and 33% (1 of 4) of the Recreational Facilities comply.